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October, 1974

Prickly Pear Creek—The Life of a Stream

Prickly Pear Creek rises in the Elkhorn Mountains north of Boulder and meanders its way north through the Helena Valley before joining Hauser Lake and the Missouri River system through the outflow of Lake Helena.

In that relatively short distance the stream falls heir to most of the natural and man-made pollution sources common in Montana.

Factors causing these pollution sources illustrate many of the problems faced by state agencies and private citizens and groups that work to improve and preserve Montana's natural waters.

According to Bob Braico, public health engineer in the Water Quality Bureau, people usually associate water pollution only with sewage but far more insidious threats to water quality exist.

"It doesn't matter whether you dump sewage or mud into a creek—it still affects the aquatic life," Braico said.

Erosion

Sediment can be a major stream pollutant. Soil eroded from rutted, unpaved roads on Forest Service land near the headwaters of Prickly Pear Creek ultimately is deposited in the stream where it may restrict growth and propagation of fish and associated aquatic organisms.

Other sediment sources in the drainage include eroding slopes along the new interstate highway, agricultural activity and road construction associated with subdivision development.

Sediment was contributed to Prickly Pear Creek when the interstate highway was constructed and when the stream was placered.

"Contrary to popular belief, eroded material is not readily flushed from streambed gravels," Braico said.

Acid Mine Drainage

Acid mine drainage also pollutes Prickly Pear Creek. Metals such as copper, lead and zinc are leached under acidic conditions from mineral deposits and tailings dumps of inactive mines primarily in the Spring Creek drainage, which joins Prickly Pear Creek at Jefferson City.

"Preliminary field investigations indicate seepage from the Alta Mine is the major source of toxic metals," Braico said.

Water Temperature

Temperature is an important water quality parameter. Aquatic communities are adapted to normal temperature variations of their environment and may be destroyed or altered drastically by relatively small changes in the normal temperature variations.

Prickly Pear Creek has been rechanneled by mining operations and by railroad and highway construction. Rechanneling can increase stream temperatures by removing shade provided by streamside vegetation and by changing a deep, narrow stream to one with wide and shallow riffle sections.

Water temperature also is raised when water used for cooling in the American Smelting and Refining Com-

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VD Workers Battle Toilet Seat Myth

An 18-year-old high school science fair winner has demonstrated that gonorrhea bacteria can be removed live from environmental surfaces up to an hour after contamination, thus adding to the growing evidence that this venereal disease may be transmitted in ways beside sexual intercourse.

Val C. Schwartz, of Doraville, Ga., recovered the most pathogenic of gonorrhea strains, Type 1 *N. Gonorrhoeae*, from toilet seats, flush handles, faucet handles, light switches and towel swatches up to an hour after contamination.

Schwartz's discovery constitutes a fly in the ointment for workers in communicable disease control, who are trying to maintain proper perspective about the manner in which veneral diseases are transmitted.

According to Rick Crankshaw, coordinator of venereal disease control and immunization programs in the Preventive Health Services Bureau, wide dissemination of information about Schartz's discovery in the popular press could easily cause damage to case-finding efforts of VD investigators.

"From an epidemiological standpoint the possibility of contracting gonorrhea from a toilet seat is so minimal as to be insignificant," Crankshaw said.

He said the misconception could result in the insistence by persons who have contracted the disease that they had caught it from a toilet seat instead of admitting the names of sexual contacts, who might then go untreated.

Schwartz's discovery coincides with research done in 1973 by a pair of Swedish scientists who recovered live gonorrhea bacteria from inanimate objects four hours after contamination.

However, their findings were discounted until now by other scientists who doubted that the gonorrhea strains they used were pathogenic.

Further research is now necessary to determine whether human volunteers injected with bacteria cultures contract the disease.

Some two million Americans were treated for gonorrhea in 1973.

letterstotheeditorletterstotheeditor

Feedlot Permit Denied When Local Residents Tell Their Story

Provisions for public comment regarding the issuance of permits for new industrial, housing or agricultural facilities sometimes are a source of annoyance to groups and individuals who comment in opposition to development only to see permits approved, it seems, routinely.

But public comment is a useful tool in bringing to light local conditions unknown to state officials who tend to make decisions the local citizens have to live with—because sometimes, information is brought to light that justifies denying a permit.

Such was the case recently in a small Montana town that had one feedlot and was just about to get another, much to the annoyance of the people who lived in the area.

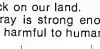
The following letter is one of 29 letters the department received opposing the new proposed feedlot. No letters in support of the development were received.

Dear Sir:

We are definitely against _____building a feedlot by _____. There should be no commercial feedlots close to any residence. _____ is causing too much pollution. Why isn't something done about it? Spraying the flies does not kill most of them. When they spray, the flies move out in swarms to nearby neighbors from _____ feedlot.

The smell is bad enough now at times from the neighboring livestock. There are enough flies around now and we don't even have livestock on our land.

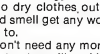
If spray is strong enough to kill flies its harmful to humans.



When I brought my clothes from the line outside this big fly came in on my clean wash last week. It's dried up now; since I killed it with the swatter.

With the energy crisis it makes sense to dry clothes outside. If the flies and smell get any worse I won't be able to.

We don't need any more livestock around to draw flies. My husband sprayed in the garage which was thick with these big flies.



This is just a sample.

Do not give a permit to operate a feedlot; _____ is a good example of what happens.

The permit to build an additional feedlot was denied once letters from angry neighbors of the existing feedlot clearly demonstrated to the state that the area already suffered from hordes of flies and obnoxious odors.

"The people were up in arms about conditions," said Steve Pilcher, agricultural wastewater specialist in the Water Quality Bureau.

Pilcher denied the request for a new feedlot "primarily because of existing conditions" especially since the feedlot would have built in an area near existing homes.

And since the letters complained about conditions in the existing feedlot, Pilcher enlisted the aid of the county sanitarian, the county attorney and a state entomologist to make recommendations for changes.

The feedlot has now been placed on a compliance schedule and has been required to improve its fly control program and its system of waste management.

"Public comment is a source of help to the department," according to Charles O'Donnell, the department's legal counsel. "It keeps the department on the ball."

TV Commercials May Be Bad for Children's Health

Nearly half of the elementary school students participating in a recent survey accepted all television commercials for health-related products as true, two researchers have reported in a recent issue of Pediatrics.

Overall, the researchers reported, the 281 students surveyed believed 70 per cent of the 781 commercials they viewed. The survey was undertaken to determine how much television influenced the health practices of children.

The study was conducted by Charles E. Lewis, M.D., and Mary Ann Lewis, R.N., M.S., of the University of California at Los Angeles. Two different elementary schools were used in the survey. School A was a university laboratory school, while school B was an elementary school serving a disadvantaged population.

For each commercial watched, students were asked to record their conclusions or inferences and to state whether they believed the message and if either they or their parents used the product advertised.

The results showed that "over 90 per cent of the students in both schools made inferences from their description of the message exactly as intended by the sponsors of the advertisement."

Whether their parents had used the products made a significant difference in whether the children believed the commercial. For example, the lowest level of credibility (51 per cent) occurred when neither the children, nor the parents had tried the product. There was a little difference in the degree of credibility for commercials advertising products aimed at children versus adults, the survey showed.

Referring to earlier studies in which 70 per cent of all health messages viewed by a panel of experts were judged inaccurate, misleading or both, the report concluded: "Television has been viewed with both alarm and pleasure. There is no doubt that it represents a powerful, ubiquitous cultural force. If, however, 70 per cent of all health messages on television are not true, and 70 per cent of these messages are believed by children, then television viewing, as presently programmed, might be labeled as hazardous to the health of future adults."

New Computerized Pancreas Tested Successfully in Germany

An insulin delivery system, which constitutes a step toward the development of an artificial pancreas that diabetics will be able to wear on their persons, has been in use since June in a West German medical center, according to *Science News*.

The system, developed by Miles Laboratories, was purchased by the University Medical Center in Ulm for use in the management of several severely ill diabetics.

The system provides constant analysis of blood sugar levels and dispenses the precise amount of insulin required to maintain the patient's blood sugar level within the normal range by use of a micro-computer.

The device will have important applications in diabetes research and in training and treatment centers and will be especially useful in the management of insulin-sensitive diabetics, diabetics in coma, or those undergoing surgery or kidney dialysis.

Hiccough Attack Lasts Eight Years

According to the Guinness Book of World Records, the longest recorded attack of hiccoughs was that afflicting Jack O'Leary of Los Angeles. It was estimated that he "hiccoughed" more than 100,000,000 times in an attack which lasted from June 13, 1948, to June 1, 1956, apart from a week's respite in 1951.

His weight fell from 138 lbs. to 74 lbs.

People sent 60,000 suggestions for cures, of which only one apparently worked—a prayer to St. Jude, the patron saint of lost causes.

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pany's East Helena plant is returned to the creek.

Fish

Game fish live in Prickly Pear Creek. Brook trout and rainbow trout hybridized with cutthroats live in the headwaters of the creek and brown trout and rainbows live in the lower reaches. Once the creek runs through East Helena, however, game fish are practically nonexistent.

A fish kill below Kaiser Cement Company at Montana City, which occurred during a chinook in mid-January of 1974, indicates the fish population in the creek. It resulted in the death of about 4,000 fish, according to Water Quality's limnologist, Abe Horpestad.

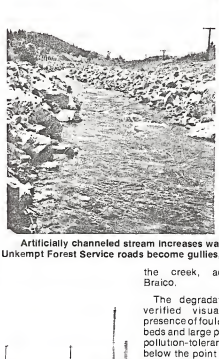
"The kill was about 60 per cent trout and 40 per cent suckers and dead fish were found from two inches to four and a half pounds," Horpestad said.

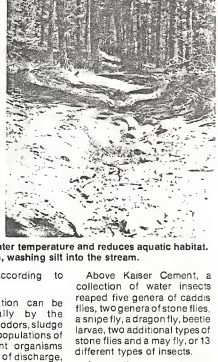
The Environmental Protection Agency is considering taking action against Kaiser for allegedly causing the fish kill, Horpestad said.

According to Horpstad, the company dumped fly ash with a consistency "like face powder" on top of a hill. A mid-winter thaw is blamed for washing the ash into the creek, causing strong alkaline conditions in the water and killing the fish.

Irrigation and Sewage Treatment

Prickly Pear Creek becomes severely polluted by poorly treated wastewater discharged from the Helena Sewage Treatment Plant. The existing plant does not have the capability to remove enough of the oxygen-demanding organic material present in the wastewater to prevent severe degradation of the creek, according to Braico.





Artificially channeled stream increases water temperature and reduces aquatic habitat. Unkempt Forest Service roads become gullies, washing silt into the stream.

The degradation can be verified visually by the presence of fouloders, sludge beds and large populations of pollution-tolerant organisms below the point of discharge, Braico said.

"Helena's new sewage treatment plant will result in a significant improvement of the water quality of the creek," Braico said.

The creek is used for irrigation downstream of East Helena and is dry at the Helena Water Treatment Plant during the summer. Farther downstream, above Mountain View School for Girls, streamflow is partially replaced by groundwater seepage, poorly treated effluent from the treatment plant and irrigation return flows.

Discussion of the life cycle of aquatic organisms in the stream is irrelevant from this point on since water does not remain in the streambed year round, Braico said.

Water Organisms

Water insects collected in four locations along the creek illustrate the altered quality of the water at points along its course.

Above Kaiser Cement, a collection of water insects reaped five genera of caddis flies, two genera of stone flies, a snipe fly, a dragon fly, beetle larvae, two additional types of stone flies and a may fly, or 13 different types of insects.

According to Water Quality's limnologist, Abe Horpestad, diversity of organisms and the presence of may flies and stone flies in particular indicate high water quality and good habitat.

Below Kaiser Cement's discharge pipe, only eight different types of insects were found: four genera of caddis flies, two genera of stone flies, beetle larvae and a snipe fly.

The decrease in diversity and lack of may flies indicate a decline in water quality and condition of habitat.

Water life collected at Mountain View School for Girls netted eight types of organisms: snails, sow bugs, beetles, earthworms, water striders, midge larvae, black fly larvae and a single may fly larva.

According to Horpestad, these organisms are pollution-tolerant except for the may fly larva and indicate the water quality has deteriorated considerably.

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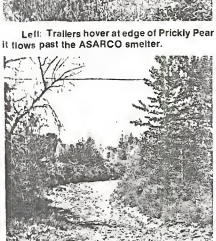
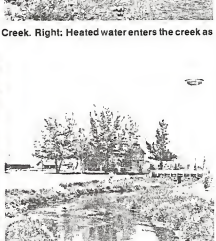
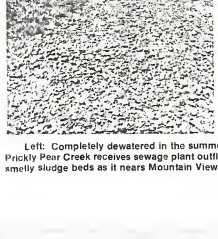
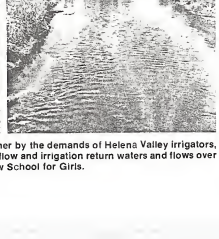




Left: Trailers hover at edge of Prickly Pear Creek. Right: Heated water enters the creek as it flows past the ASARCO smelter.





Left: Completely dewatered in the summer by the demands of Helena Valley irrigators, Prickly Pear Creek receives sewage plant outflow and irrigation return waters and flows over smelly sludge beds as it nears Mountain View School for Girls.

Test Results of Spring Creek Tributary

Substance	U.S. Public Health Service Drinking Water Standards	Spg. Creek Tributary
Turbidity	5*	3,729*
Copper	1.00 mg/liter	0.75 mg/liter
Manganese	.05 mg/liter	480. mg/liter
Arsenic	.01 mg/liter	.03 mg/liter
Iron	.3 mg/liter	160. mg/liter
Zinc	5.0 mg/liter	330. mg/liter
Cadmium	.01 mg/liter	32. mg/liter

*Measured in Jackson turbidity units

Prickly Pear Creek—The Life of a Stream

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At a fourth collection site at the point where Lake Helena runs into Hauser Lake, nine types of water organisms were found: minnows, sow bugs, daphnia, cranefly larvae, water boatmen, freshwater shrimp, midge larvae, crayfish and a young fish of unidentified species.

At this point, according to Horpestad, water quality has recovered to some extent, as evidenced by the presence of cranefliés, freshwater shrimp, daphnia and the young fish, all of which, he said, are "good water" indicators.

Wastewater Permits

The Water Quality Bureau issues wastewater discharge permits to several industries, domestic and municipal dischargers of treated sewage and agricultural concerns using Prickly Pear Creek.

The permits control the amounts of substance that may be added to the water and are the enforcement tool of the Montana Pollutant Discharge Elimination System (MPDES), which the bureau administers.

Montana, with its MPDES program, is the first state in federal Region VIII to take over the federal wastewater discharge permit program (NPDES) from the Environmental Protection Agency. The bureau now also administers NPDES permits.

The program was instituted as part of the federal Water Pollution Control Act Amendments of 1972 and requires that every discharger of pollutants from a point source into navigable waters be under a wastewater discharge permit issued by EPA or its state equivalent.

On Prickly Pear Creek, Kaiser Cement Co. has a permit originally issued by EPA which allows the discharge of non-contact cooling waters and collected seepage from a process water treatment system. Both discharges are limited with respect to total suspended solids and pH. One discharge has an additional temperature limit.

American Smelting and Refining Co. has an MPDES permit which allows the discharge of non-contact cooling waters only and limits pH and temperature.

The City of Helena has an NPDES permit which allows the discharge of primary treated domestic wastewater limited to BOD, total suspended solids, pH and fecal coliforms.

Alhambra Manor near Clancy has applied for an MPDES permit to discharge treated domestic wastewater and will be under permit by the end of 1974. The discharge will be limited for BOD, total suspended solids, pH, fecal coliforms and total residual chlorine.

Two agricultural wastewater discharge permits also are in the application stage, one for a confined livestock feeding operation at McLeod Farm on the north shore of Lake Helena and one for irrigation return waters from the Helena Valley Irrigation District.

Limnologist Horpestad collects water insects from Prickly Pear Creek to sort them for variety of species.

Bob Braico tests water from a Spring Creek tributary on a conductivity bridge, which measures dissolved substances in the water.

Above, left to right: Aquatic organisms arranged in vertical columns show the reduced variety of "good water" species found in collection points along Prickly Pear Creek as water quality degenerates. Below: Total number of organisms collected at the four collection sites also shows a decrease in the number of organisms as water quality deteriorates.

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